Step 3. **Gather and analyze the data.** This analysis should lead to understanding the processes that create the results for the different student groups.

Variation. A variation would be to start with one type of data and consider a question you can answer with that data; add another type of data and grow the questions, then add another type of data until you use all four types of data. Example follows.

Why are students not scoring better on the state 8th grade math assessment?

Types of Data	Question You Answer With This Type of Data	Data to Gather
Student Learning	What do our 8th graders know and not know on the Grade 8 math assessment?	Student learning results by item analysis, for the past three years
Student Learning by Demographics	Who are the students who are not scoring well on the Grade 8 math assessment?	Student learning results by item analysis, and by demographics, e.g., gender, ethnicity/race, language proficiency, learning disabilities, indicators of poverty, mobility.
Student Learning by Demographics by School Processes	Are there differences in results on the Grade 8 math assessment for the different subgroups of students, by the way math is taught?	Student learning results by demographics, and by classroom.
Student Learning by Demographics by School Processes by Perceptions	Do student perceptions of how they are learning math have any relationship to the scores they are getting?	Student learning results by demographics, by classroom, and student perceptions.

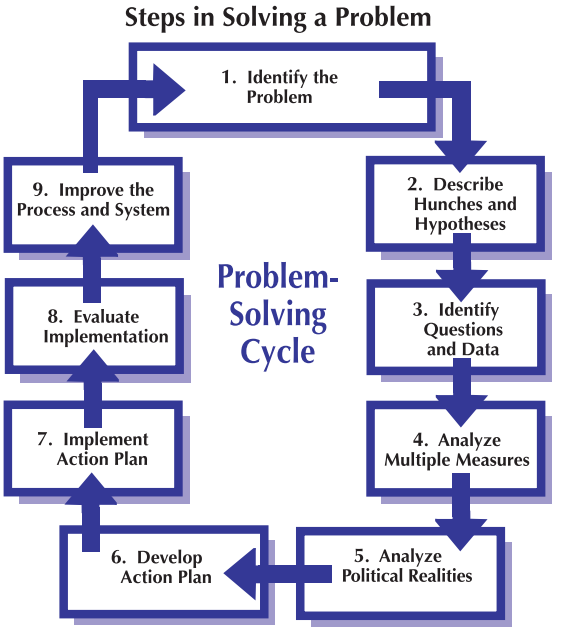
USING INTERSECTIONS IN CONTRIBUTING CAUSE ANALYSES

Problems cannot be solved by the same level of thinking that created them.

Albert Einstein

Intersections of multiple measures of data are powerful. They show us how much more we can see when we open our eyes wide and use all of our lenses. A way to tap into the power of intersections is through a problem-solving cycle. The problem-solving cycle facilitates powerful exploration of the intersections while helping us uncover contributing causes of our undesirable results (AKA, problems or challenges). There is seldom a single root cause for an undesirable result—there are usually several contributing causes. When combining multiple causes or predictors of risk, a compounding effect takes place. That is why it is necessary to look at all potential causes by looking at all data available.

The problem-solving cycle facilitates powerful exploration of the intersections while helping us uncover contributing causes of our undesirable results (AKA, problems or challenges).



THE FIRST FOUR STEPS IN THE PROBLEM-SOLVING CYCLE

Step 1. ***Identify the problem.***
Step 2. ***Staff members brainstorm at least 20 reasons they believe the problem exists.***
Step 3. ***Identify questions and data needed to answer each question.***
Step 4. ***Analyze the data.***

The problem-solving cycle uses effective problem-solving strategies to engage staff in:

- their preconceptions,
- new levels of thinking about a problem/challenge,
- making deeper data analysis their idea,
- making improving processes their idea,
- showing what the data are saying, and
- data-informed solutions.

The first four steps in the problem-solving cycle are the most important for thinking broader about a "problem" before solving it.

Step 1. Identify the problem. The process begins with the identification of the problem, or undesirable results. For example: *Not enough students are proficient in Mathematics.*

Step 2. Staff members brainstorm at least 20 reasons they believe the problem exists. Getting to 20 is very important for effective brainstorming. The deep thinking that gets us to numbers 17-20 begin to uncover contributing causes of the problem. Resist the urge to "prioritize" the twenty hunches. This brainstorming gets us to where we want to be for the next step.

THE PROBLEM-SOLVING CYCLE: Example Hunches and Hypotheses

List hunches and hypotheses about why the problem exists.	
1. Too many students live in poverty.	11. We don't know what data are important.
2. There is a lack of parent support.	12. We don't know how to use the data.
3. There is too much student mobility in our school.	13. We don't get the data soon enough to make a difference.
4. The students aren't prepared for school.	14. Not all our curriculum is aligned to the standards.
5. Many of our students are not fluent in English.	15. Teachers don't know how to setup lessons to teach to the standards.
6. Even if the students don't speak English, they have to take the test in English.	16. We need to know sooner what students know and don't know.
7. Students don't do their homework.	17. We are not teaching to the standards.
8. Students do not like to read.	18. Our expectations are too low.
9. There is no district support.	19. We need to collaborate to improve instruction.
10. There are budget problems at the school and district levels.	20. Teachers need professional learning to work with students with backgrounds different from our own.

Step 3. Identify questions and data needed to answer each question. Next, staff members go back to the problem: *Not enough students are proficient in Mathematics,* and identify the questions that they must answer with data, and the data they must gather to answer each question.

THE PROBLEM-SOLVING CYCLE
Example Questions and Data Needed

Questions	Data Needed
1. Who are the students who are not performing?	Student achievement results by student groups.
2. What do the students know and what do they not know?	Student achievement results by standards.
3. Are all teachers teaching to the standards?	Standards questionnaire.
4. How are we teaching Mathematics, ELA—actually, everything?	Teacher reports about teaching strategies to grade-level teams.
5. What is the impact of our instruction?	We need to follow student achievement by teachers and by course.
6. What do teachers, students, and parents think we need to do to improve?	Teacher, student, and parent questionnaires and follow-up focus groups.
7. What does our data analysis tell us about what we need to do to improve?	Study data analysis results.

Step 4. Analyze the data. Staff follow up with the data and analyze what needs to change to get different results.

When schools discover gaps or undesirable results, they naturally want to identify solutions immediately to close the gaps. To permanently eliminate the gaps, schools must uncover root causes, or contributing causes (we believe there is more than one cause for undesirable results), and eliminate them—not the surface issues.

To permanently eliminate the gaps, schools must uncover root causes, or contributing causes (we believe there is more than one cause for undesirable results), and eliminate them—not the surface issues.

The problem-solving cycle is a great activity for getting all staff involved in thinking through undesirable results, or problems, before jumping to solutions. By starting with brainstorming hunches and hypotheses, all staff can be heard. When all voices are expressed, and heard, there is a better chance of all staff using the information later. During the brainstorming, all staff members hear what they believe are the reasons for the undesirable results. There is also an important opportunity to acknowledge challenges facing teachers, which usually show up as the first five to ten hunches. Once those hunches are written down, staff can go past them. As they go past those hunches that they feel have been holding them back, staff begin to think how their current programs and processes might be contributing to the causes of

By starting with brainstorming hunches and hypotheses, all staff can be heard.

Deeper data analyses show what processes need to improve to get different results.

undesirable results. Next, staff will need to determine what questions must be answered with data (and what data) before the "problem" can be solved. It is their idea to go deeper into the data—sometimes into areas they might not go to under typical situations. Staff members naturally use the multiple measures of data with this process, and they might not without the process. Deeper data analyses show what processes need to improve to get different results.

Effective data analyses and problem-solving methodologies embrace the following key principles of organizational improvement:

- ***Encourage staff identification and ownership of the process(es) at the root.***
- ***Empower those that need to carry out change.***
- ***Focus on comprehensive data analysis.***
- ***Streamline the improvement process.***

Effective data analyses and problem-solving methodologies embrace the following key principles of organizational improvement:

- ***Encourage staff identification and ownership of the process(es) at the root.*** People come to learning with preconceptions based on existing understanding and practices. If these initial understandings are not explicitly engaged, the result will be outright resistance or superficial compliance (at best) and a perpetuation of the status quo. Therefore, existing understandings and practices have to get on the table. (Katz, 2012)
- ***Empower those that need to carry out change.*** Using data should be inclusive of and engaging to those who must embrace and carry out change. This represents an important shift towards systemic and systematic improvement, away from personality focused, top-down driven methods.
- ***Focus on comprehensive data analysis.*** Staff members need to think through a problem in an informed way, considering all data, before simply jumping to a solution.
- ***Streamline the improvement process.*** Empowerment requires that all staff see the immediate impact of their work—the data analysis. A structured process that makes big problems manageable and facilitates a quick move to resolution is required. Because all staff are involved in the process and are following along, improvement can be made quickly.

PREDICTIVE ANALYTICS

At the highest levels of data use is prediction and optimization. We want to use data to predict and ensure success, and to predict and prevent failure.

The concepts and activities presented thus far in this book can be performed by teachers and administrators to know how the learning organization got to where it is now, and to provide valuable information about how to get different results. Staff can put together a descriptive data profile, look for trends and commonalities across multiple measures of data, and perform an intersection analysis or contributing cause analysis, at any time, to go deeper into their data.

At the highest levels of data use is prediction and optimization. We want to use data to predict and ensure success, and to predict and prevent failure. With this information, we can optimize our processes to enhance our results. We can do a